



Caltrans Division of Research,
Innovation and System Information

Research Results

Maintenance

MARCH 2013

Project Title:
Evaluation of Culvert
Cleaning Technology

Task Number: 1954
Completion Date: June 30, 2012

This project evaluated and deployed remote-controlled equipment that can remove debris from culverts in Caltrans maintenance operations.

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Remote-Controlled Culvert Cleaner

Increasing the safety and efficiency of culvert cleaning operations

WHAT WAS THE NEED?

Culverts channel water under roads and highways. During storms and water flow, debris builds up in the culverts. If the debris is not removed, flooding can cause damage to the surrounding area. Cleaning culverts is a labor-intensive process and, depending on the size, the culverts can be hazardous or difficult to access.

Most medium-sized culverts are cleaned using vacuum trucks with a high-pressure nozzle to wash the debris to the suction hose. Significant manual labor is required to manipulate these tools. The water-logged dirt is then transported to a collection area that can be miles away from the job site. In taller culverts, crews can use earth-moving machines. An operator walks behind the machine as it goes through the culvert, which can be a confined space with limited air supply. Working in confined spaces requires crews to be trained in monitoring procedures and special ventilation equipment.

With remote-controlled tunnel muckers, the operator stands outside the culvert, which reduces physical injuries and hazards related to working in confined spaces. Operators are also not exposed to exhaust fumes and unstable ground. The machines can fit in rectangular culverts as small as 4 feet by 4 feet or round culverts 5 feet in diameter, and are capable of easily removing large rocks and debris. Smaller machines are also available. Another advantage is that no water is used during the operation.

WHAT WAS OUR GOAL?

The project's goal was to determine the suitability and performance of a small remote-controlled machine for clearing sand, gravel, and other debris from culverts.



*Remote-controlled front-end loader
cleaning a concrete culvert*



Caltrans improves mobility across
California by performing applied
research, developing innovations,
and implementing solutions.

WHAT DID WE DO?

Starting in 2008, UC Davis's Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center, in partnership with the Caltrans Maintenance Statewide Equipment Managers, evaluated and deployed the MicroTraxx radio-controlled tunnel mucker from ROHMAC, Inc. AHMCT monitored the equipment using cellular-based GPS tracking and collecting feedback from users through site visits and direct contact. Based on the responses, the team implemented various improvements. AHMCT also provided training and equipment support, helping resolve problems with radio communication, mechanical part failures, overheating, and vibration.

WHAT WAS THE OUTCOME?

AHMCT and Caltrans Maintenance determined that the remote-controlled tunnel mucker is valuable in culvert cleaning operations and have recommended purchasing additional units. The tunnel muckers decrease the cost of culvert cleaning by reducing the equipment and crew size needed for cleaning. The machines can clean culverts four times faster than typical methods and reduce staff exposure to hazardous conditions.

As of 2011, the tunnel mucker has been used in Districts 3, 4, 5, 6, 7, 8, 9, 10, and 11. The equipment has been well received by maintenance crews. As a result of this research project, Maintenance Statewide Equipment Managers has requested acquiring three more culvert cleaning units to use statewide.



Operator controlling loader.
Fletcher Creek, Highway 89, District 3

WHAT IS THE BENEFIT?

Remote-controlled tunnel muckers improve the safety and efficiency of culvert cleaning operations. They provide a safety and cost benefit to current mid-sized culvert cleaning methods. The machines reduce operational costs, the time needed for cleaning, and the potential for labor injuries. The equipment can be used by any entity, such as cities, counties, or other Departments of Transportation, to maintain culverts that are 48 inches or greater.

LEARN MORE

To view the evaluation:

<http://ahmct.ucdavis.edu/?projects=microtraxx-tunnel-mucker-evaluation>



Acton Canyon Wash,
Highway 14, District 7



Wildflower Canyon Road,
Highway 58, District 6